Measuring the Optical Light Curves of Fermi Blazars

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We propose to measure the K2 long cadence light curves of eight Fermi gamma-ray blazars (doubling our Cycle 1 sample) and a comparison sample of 227 radio-loud quasars (RLQSOs) and radio-quiet quasars (RQQSOs). The gamma-ray blazars' parent population is radio-loud quasars - the blazars' relativistic jets are most directly pointed at us producing highly beamed jet emission. Our first scientific goal is to determine the origin of optical emission in these gamma ray blazars at the time of K2 observations. Three candidate origins are: 1) a single dominant synchrotron-emitting region in a jet; 2) multiple synchrotron-emitting regions in a jet; and 3) an accretion disk with multiple thermal emitting regions. Our second goal is to see how the optical variability amplitude and power spectral densities (PSDs) of blazars, RLQSOs, and RQQSOs differ on minute-to-months timescales. The candidate origins for optical emission from RLQSOs are the same as those for blazars, but without enhanced relativistic beaming in the jet. Optical variations in RQQSOs may originate in an accretion disk with multiple thermal emission regions or the Rayleigh Jeans tail of the hot corona.

We will measure the PSDs of the light curves and determine the PSD slopes which are related to the underlying variability processes, such as turbulence in the relativistic jets or stochastic fluctuations in thermal emission from segments of the accretion disk.